WHAT IS CLAIMED IS:

1. An apparatus for monitoring the functionality of an optical element comprising:

a detector; and

a light source whose radiation is reflected to the detector by a surface of the optical element facing the detector and the light source.

2. The apparatus of claim 1, wherein the light source is arranged to direct radiation to the center of the surface of the optical element.

3. The apparatus of claim 1, wherein the light source and the detector are disposed laterally to the optical element.

4. The apparatus of claim 1, wherein the light source and the detector are both disposed at the same angle to the surface of the optical element.

5. The apparatus of claim 1, wherein the radiation of the light source is directed to the surface of the optical element at an angle of less than 30^{o}.

6. The apparatus of claim 1, wherein the light source and the detector are integrated in a holder for the optical element.

7. The apparatus of claim 1, wherein the light source is a light emitting diode and the detector is a photodiode.

8. The apparatus of claim 1, further comprising a comparator for comparing a detected light intensity detected by the detector with a reference intensity.

9. The apparatus of claim 8, wherein the comparator generates an error signal when the detected light intensity differs from the reference intensity by a defined value.

10. The apparatus of claim 1, wherein the optical element comprises zinc selenide.

11. The apparatus of claim 1, wherein the optical element comprises gallium arsenide.

12. The apparatus of claim 1, wherein the optical element comprises diamond.

13. An apparatus for monitoring the functionality of an optical element comprising:

a detector; and

a light source whose radiation is reflected by a surface of the optical element to the detector, wherein the surface faces the detector and the light source, wherein the radiation of the light source is directed to the center of the surface of the optical element, wherein the light source and the detector are disposed laterally to the optical element, wherein the light source and the detector are disposed at the same angle to the surface of the optical element, and wherein the radiation of the light source is directed to the surface of the optical element at an angle of less than 30°; and

a comparator for comparing a light intensity detected by the detector with a reference intensity and for generating an error signal when the detected light intensity differs from the reference intensity by a defined value.

14. A laser comprising:

an optical element;

a detector;

a light source whose radiation is reflected by a surface of the optical element facing the detector and the light source to the detector, wherein the light source and the detector are arranged to monitor the functionality of the optical element.

15. The laser of claim 14, wherein the laser is a CO_2 laser.

16. The laser of claim 14, wherein the surface is a mirror surface provided in a laser resonator.

17. The laser of claim 16, further comprising a laser resonator, wherein the surface is an inner side of an output coupler mirror facing the laser resonator.

18. The laser of claim 16, wherein the surface is an outer side of an output coupler mirror facing away from the laser resonator.

19. The laser of claim 14, further comprising a comparator for comparing a light intensity detected by the detector with a reference intensity and generating an error signal when the detected light intensity differs from the reference intensity by a defined value.

20. The laser of claim 19, wherein the error signal causes the laser to be switched off.

21. The laser of claim 14, wherein the radiation of the light source is directed to the center of the surface of the optical element.

22. The laser of claim 14, wherein the light source and the detector are disposed laterally to the optical element.

23. The laser of claim 14, wherein the light source and the detector are disposed at the same angle to the surface of the optical element.

24. The laser of claim 14, wherein the radiation of the light source is directed to the surface of the optical element at an angle of less than 30°.

25. The laser of claim 14, wherein the optical element comprises zinc selenide.

26. The laser of claim 14, wherein the optical element comprises gallium arsenide.

27. The laser of claim 14, wherein the optical element comprises diamond.

28. An apparatus for monitoring damage to an optical element of a laser resonator comprising:

a light source whose radiation is reflected by a surface of the optical element;

a detector for detecting radiation emitted from the light source and reflected by the

surface of the optical element, wherein the detector is adapted for detecting a characteristic of the reflected radiation indicative of damage to the optical element.

29. The apparatus of claim 28, wherein the radiation of the light source is directed to the surface of the optical element at an angle of greater than 60° to the normal of the surface of the optical element.

30. The apparatus of claim 28, wherein the light source and the detector are integrated in a holder for the optical element.

31. The apparatus of claim 28, wherein the light source is a light emitting diode and the detector is a photodiode.

32. The apparatus of claim 28, wherein the characteristic of the reflected radiation is an intensity of the reflected radiation, and further comprising a comparator for comparing the intensity of the reflected radiation with a reference intensity.

33. The apparatus of claim 32, wherein the comparator generates an error signal when the light intensity of the reflected radiation differs from the reference intensity by a defined value.

34. The apparatus of claim 33, wherein the error signal is used to switch off a laser whose optical element is monitored by the apparatus.

35. A method for monitoring damage to an optical element of a laser resonator, the method comprising:

shining a light beam onto a surface of the optical element;

detecting an intensity of a reflected portion of the light beam that is reflected by the optical element; and

comparing the intensity of the reflected portion of the light beam with a reference intensity.

36. The method of claim 35, wherein the light beam is directed to the surface of the optical element at an angle of greater than 60° to the normal of the surface of the optical element.

37. The method of claim 35, further comprising generating an error signal when the intensity of the reflected portion of the light beam differs from the reference intensity by a defined value.

38. The method of claim 37, further comprising switching off a laser in response to the error signal.